



UNITED STATES PATENT AND TRADEMARK OFFICE

mm
UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/874,501	06/05/2001	Wei Gao	22435-004	5900

30623 7590 01/20/2004

MINTZ, LEVIN, COHN, FERRIS, GLOVSKY
AND POPEO, P.C.
ONE FINANCIAL CENTER
BOSTON, MA 02111

EXAMINER

MENEFEE, JAMES A

ART UNIT PAPER NUMBER

2828

DATE MAILED: 01/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/874,501	Applicant(s) GAO, WEI	
	Examiner James A. Menefee	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-30 and 32-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-30 and 32-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Paul IP
PAUL IP
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>20031017</u> . | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

Response to Amendment

In response to the amendment filed 11/20/2003, the drawings are amended. The claims are not amended, and claims 1-3, 5-30, and 32-36 remain pending.

Drawings

The drawings were received on 11/20/2003. These drawings are acceptable.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 5, 10-13, 16-21, 23-30, and 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peterson (previously cited US 6,072,815) in view of Roberts et al. (previously cited US 6,335,548).

Regarding claim 1, 32-33, and 35, Peterson discloses in Fig. 1 a laser diode assembly comprising a carrier 18 having a top and bottom, the top having a thermally conductive layer 32 sized for attaching at least two bonding members thereto, a laser diode 12 having a top and bottom, the bottom being electrically coupled to the carrier 18 and the top inherently having at least one thermally conductive pad formed thereon and sized for attaching at least one bonding member thereto, and first and second bonding members (wires not numbered) thermally coupling

Art Unit: 2828

the conductive pads to the conductive layer 32. While there is not an explicit disclosure of at least one conductive pad on the laser, it is inherent that this is the case because such pads are necessary for attaching bonding wires. It is not explicitly disclosed that the layer 32 or the pads are thermally conductive, or that the bonding members thermally couple the layers to the pad. However, such elements are typically made of a metal material, and thus will necessarily be thermally conductive. It is not disclosed that there are two conductive pads on top of the laser diode. However, Roberts teaches that it is advantageous to include more than one bonding pad in a place where there are bonding pads (par. bridging col. 16-17). It would have been obvious to one skilled in the art to include these extra bonding pads in order to decrease the chance of catastrophic failure, as taught by Roberts.

Regarding claims 2-3, the carrier 18 is insulating and may be made of BeO or AlN.

Regarding claim 5, if there are a number of conductive pads, as deemed obvious above, then some will necessarily be formed on opposing sides of a top side of the laser diode 12.

Regarding claim 10, it is not disclosed that the laser diode has top and bottom electrodes. A laser diode will typically have top and bottom electrodes. It would have been obvious to make the laser diode in this manner so that it may be electrically pumped. As one of the electrodes will be on top, at least one of the conductive pads will be coupled to the top electrode.

Regarding claim 11, it is not explicitly disclosed that heat will be dissipated from the laser through the conductive pads. Since the bonding wires are made of conductive material, then heat will necessarily dissipate out from the laser through the wires.

Regarding claim 12, the bonding members are wires.

Regarding claim 13, there are numerous bonding members, therefore a third bonding member is included.

Regarding claims 16 and 34, the carrier transfers heat from the conductive layer down through to the bottom of the carrier.

Regarding claims 17-18, there is further a Peltier element 16 that acts as a TEC and a heat sink.

Regarding claims 19-20, it is not disclosed that the diode has n-type and p-type sides as claimed. It is well known that a laser diode may comprise n and p sides. It would have been obvious to make the laser diode in this manner so that the laser diode can be efficiently and electrically pumped, as is well known. In such a laser, the top is typically one conductivity, while the bottom is the other. These can be switched depending on the manner in which current will be conducted through the laser, and such a switching will not significantly change the operation of the device and is deemed an obvious design choice. Depending on which of the p-type or n-type side is chosen for the top, claim 19 or 20 will be met.

Regarding claim 21, at least one of the bonding members carries an electrical signal.

Regarding claim 23, there are numerous bonding members, therefore it can be interpreted that more than one bonding member is included as the first bonding member.

Regarding claims 24-25, it is not disclosed that the number of first bonding members is either equivalent or not equivalent to the number of second bonding members. Peterson does not list the numbers of first and second bonding members, so there is no way of knowing if the numbers are equivalent or not. However, the number of bonding members being equivalent or non-equivalent does not appear to be significant to the operation of the device. Thus, it would

Art Unit: 2828

have been an obvious design choice to use either the same amount of wires or a different amount of wires for each.

Regarding claims 26 and 29, the wavelength of emission of the laser diode is not disclosed. However, 980 nm lasers are well known in the art, and it would have been obvious to one skilled in the art to use this specific type of laser diode as a matter of obvious engineering design choice depending on the intended application for the use of the laser.

Regarding claims 27-28, these claims merely detail the intended use of the device. The intended use of a device is not germane to the patentability of the device itself, and therefore these claims have not been given patentable weight.

Regarding claim 30, as the laser diode is mounted on the carrier, it is inherent that the carrier is structured and arranged for mounting a laser diode thereto.

Claims 6-9 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peterson and Roberts as applied to the claims above, and further in view of Kato et al. (previously cited US 6,349,104). Peterson and Roberts teach the limitations of the claims shown above, but do not teach that the laser diode contains a ridge as claimed. Kato teaches in Fig. 2 a laser diode having a ridge, where the ridge is between bonding pads 12 at the top of the laser diode, and at least one of bonding members 12a, 12b does not pass over the ridge, depending on the placement of the laser diode and the portion it is bonded to. It would have been obvious to one skilled in the art to replace the laser diode Peterson with the laser diode of Kato because this laser diode has improved high power lasing characteristics, as taught by Kato.

Claims 14-15 and 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Peterson and Roberts as applied to the claims above, and further in view of either Buller et al. (US 4,714,953) or Ng (US 5,177,500).

Regarding claim 22, Peterson and Roberts teach the limitations of the claims shown above, but do not teach that the bonding wires act only as thermal conductors. Buller and Ng each teach bonding wires used solely for thermal conduction and not for electrical connection. It would have been obvious to one skilled in the art to include such wires as an additional means of removing excess heat from the laser, as taught by Butler and/or Ng.

Regarding claims 14-15, metallized layers 32,34 are electrically separated from each other, but it is only disclosed that there is bonding to layer 32, not 34. However, as shown above in the rejection of claim 22, it would have been obvious to one skilled in the art to include thermally conductive bonding wires on Peterson's system. It would have been obvious to one skilled in the art to include such thermal wires on any region where there is a connection, i.e. additionally to section 34, for the same reasons as given above, i.e. in order to provide an additional means of removing excess heat from the laser, as taught by Buller and/or Ng.

Response to Arguments

Applicant's arguments filed 11/20/2003 have been fully considered but they are not persuasive. Applicant made the following arguments:

The arguments against the rejections based on the Kuribayashi reference are persuasive and the rejections based on Kuribayashi as primary reference are withdrawn.

Art Unit: 2828

Applicant argues that the “Office Action fails to provide any support for this allegedly well known feature” of claim 22 (p. 4 of response). Support is provided in the new grounds of rejection above. Though this is a new grounds of rejection, it is still proper that this action may be made final since the newly cited art is used merely to provide support for the previously given Official Notice. See MPEP 2144.03 D.

Applicant argues “Peterson does not disclose or suggest that the bonding wires are used for thermal transfer.” (p. 6). However, it is inherent that Peterson’s bonding wires will perform thermal transfer and thus are thermally coupling. Chen et al. (US 6,576,985, see col. 6 lines 4-9), Ramirez et al. (US 6,188,130, see col. 1 lines 29-31), and Mahulikar et al. (US 5,608,267, see col. 1 lines 35-37) each teach that bonding wires dissipate heat, thus providing thermal transfer. Though these references imply poor heat dissipation of bonding wires, they still dissipate heat, and thus are thermally conductive and will be thermally coupling.

Applicant also argues “Peterson teaches away from using the bonding wires for heat transfer with the use of the thermal spreader for the heat transfer.” (p. 6). However, it does not matter if Peterson teaches away from the use of the bonding wires for heat transfer, because it has been shown above that Peterson’s wires inherently possess the characteristic of thermal coupling. Further, just because Peterson teaches an additional means of heat transfer does not mean that Peterson teaches away from using all other kinds of heat transfer; both bonding wires that transfer heat and the thermal spreader may be present in a single system, and each is present in Peterson’s system.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Menefee whose telephone number is (703) 272-1944. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Ip can be reached on (703) 272-1941. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



JM

January 6, 2004



PAUL IP
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800